UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,624	10/27/2003	Philip L. Cole	COPL:002US	2611

32425 7590 04/16/2008
FULBRIGHT & JAWORSKI L.L.P.
600 CONGRESS AVE.
SUITE 2400
AUSTIN, TX 78701

EXAMINER	
DUDNIKOV, VADIM	

ART UNIT	PAPER NUMBER
3663	

MAIL DATE	DELIVERY MODE
04/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/694,624	COLE, PHILIP L.
	Examiner	**Art Unit**
	VADIM DUDNIKOV	3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-33* is/are pending in the application.

4a) Of the above claim(s) *4,5 and 10-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6,7,9 and 28-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 December 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed 2/19/2008 in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on February 19, 2008 have been entered.

Response to Amendment

2. Amendment filed 2/19/2008 forms the basis for this Office Action.

Claim 1 has been amended. Claims 4 and 7 have been canceled. Claims 1-3, 6, 7, 9, and 10-33 have been pending. Claims 4-5 and 10-27 have been withdrawn from consideration as non-elected. Claims 1-3, 6, 7, 9, and 28-33 have been examined.

3. The amendment filed 2/19/2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Although the fission-fragment detectors also are photon detectors it constitutes new matter to remove

"fission-fragment" in the Specification as done in the Amendment, because now the related photon detection is not necessarily the one carried out in the fission fragment detectors.

Applicant is required to cancel the new matter in the reply to this Office Action. Comments on Remarks submitted with said amendments are included below under Response to Arguments.

Response to Arguments

4. Applicant's arguments see pages 9-14, filed 2/19/2008, with respect to the previous Office action have been fully considered but are not fully persuasive.

Those rejections that have been overcome by amendment are omitted from the current Office Action and are to be considered withdrawn.

The amendments to specification, to claim 1 are acknowledged. Claims 1-3, 6, 7, 9 and 28-33 have been examined.

On the Applicant’s remarks on pages 9, 10 regarding claim rejection under 35 U.S.C. 112 , Examiner respectfully disagrees that the graph 600 in FIG. 6 can be created by combining signals from three Applicant’s different detection components because every signal from said detector represents a number of counted photons in desirable energy range of said detector sensitivity which must be displayed on the graph as a horizontal line crossing the corresponded energy range, but not diagonal lines 605, 610, 615 as shown in Fig. 6. The graph 600 represents “a simulated photon energy

distribution of the Bremsstrahlung spectra resulting from interaction of electron beam directed upon the radiator plotted on a log-log scale" (page 14, lines 12+) and cannot support the capability of the photon detection in the corresponding energy ranges. Claimed capability can be enabled by presenting of the detector's sensitivity to the photons with different energy (for example, as presented in FIG. 3 of Neale et al. (US Patent No. 5,524,133)).

Applicant's arguments relating on pages 10-15 relating the claims rejection under 35 USC 103 are not persuasive because relating to the amended claim language rather than rejected claim language.

Rejection of claims 1-3, 6, 7, 9 and 28-33 under 35 USC 103 is proper because Neale teaches main limitation of claim 1: (using a **single broad band** linear accelerator **X-ray source and using several photon detectors with different ranges of energy sensitivity)** "a more preferred arrangement in which a **single broad band** linear accelerator **X-ray source** 40 produces X-rays in the range 1-10 MeV and as previously mentioned collimators (not shown) are used to form a narrow fan beam of X-ray 42 which if the linear accelerator 40 is spaced some meters from a shipping container such as 32, will embrace the full height of the container. Beyond the container is located an additional collimator (not shown) and a tall column of detector elements 44 each of which is adapted to respond separately to low energy (photons as show in Fig. 6, 7) electrons and high energy (photons as show in Fig. 6, 7) electrons (typically 1 MeV and 5 MeV respectively) transmitted by the container 32, to produce two separate outputs one corresponding to the quantity of X-rays of the lower energy and the other the

quantity of X-rays of the higher energy received by the detector" (column 12, lines 44+). Groom's teaching supports a capability of Neale's detector to detect photon with energy range up to 50 MeV as detailed in previous Office Action. Gunther's teaching supports using an array of fission-fragment detectors and the array of fission-fragment detectors is sensitive to different ranges of photon beam energy as one of energy sensitive photon detector in Neale's detection system.

Neale's teaching also support a new limitation of amended claim 1: energy sensitive detectors are arranged **sequentially** in a direct path of the emerging photon beam such that each receives the emerging photon beam (detected by **pairs of crystals** placed **one behind the other** the **front crystal** being sensitive to **lower energy** X-rays while the **rear crystal** is sensitive to **higher energy** X-rays), and are sensitive to different ranges of photon beam energy.

Rejection of amended claims are established in light of further consideration and search of the prior Art. See rejections underneath.

Drawings

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed "fissile material" must be shown or the features canceled from the claims (see claims 1, 17, 22 for "primary system"). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Specification is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new

matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Although the fission-fragment detectors also are photon detectors it constitutes new matter to remove "fission-fragment" in the Specification as done in the Amendment, because now the related photon detection is not necessarily the one carried out in the fission fragment detectors.

7. The specification is objected to because the limitation “identifying fissile material within an interrogated vessel” claim 1, is not enabled in specification, as filed. Application as filed is enabled for “determining a range of an atomic number of material in a container” but cannot distinguish a fissile material from a non-fissile material with a close atomic number. A material that can produce a self-sustaining chain reaction by itself is said to be fissile (see Knief, "Nuclear Engineering, Hemisphere Publishing Corporation, 1992, pages 4, 10, 41). For this reason the Specification fails to enable the invention.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims **1-3, 6, 7, 9 and 28-33** are rejected under 35 U.S.C. 112, first paragraph, as failing to disclose Applicant's subject matter.

The claims contain subject matter which was not enabled in claim in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The reasons for this rejection are the same as those for the objection to the Specification for lack of enablement as detailed in section 7.

Claims **2, 3, 6, 7, 9** and **28-33** are rejected as depended of rejected claim 1.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims **1-3, 6, 7, 9 and 28-33 are** rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps or essential parameters or elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted steps of claim 1 are: generation of incident photon beam; determination of an energy spectra of the incident photon beam; detection of energy spectra of an emerging photon beam without the fissile material, a distinction of a fissile material from a non-fissile material with a close atomic number. The omitted parameters are: energy spectrums of incident photon beam.

Claims **2, 3, 6, 7, 9** and **28-33** are rejected as depended of rejected claim 1.

12. Claims **1-3, 6, 7, 9 and 28-33** are rejected under 35 U.S.C. 112, second paragraph, as indefinite.

Limitation of the claim 1, “identification of a drop in photon yield in at least one of the three signals” is indefinite because can have different interpretations, such as a change of an energy spectrum of incident beam, emission of high energy photon induced by photon interaction with detected material or a change of a spectral transparency of an inspected object.

Claims **2, 3, 6, 7, 9** and **28-33** are rejected as depended of rejected claim 1.

Claim rejections – 35 USC § 103

13. The following is a quotation of USC 103 (a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims **1-3, 6, 7, 9,** and **28-33** are rejected under 35 U.S.C. 103(a) as being obvious over Neale et al. (U.S. Patent # 5,524,133; Neale hereinafter, cited before) in view of Gunther et al, (“Applicability of a simple parallel plate avalanche detector to photofission experiments”, Nucl. Instrum. Mhetods, 163, 459-461, 1979; Gunther hereinafter, cited before) and in view of Groom (“Photon and electron interaction with matter”, LBNL, 1998, p. 152, 153).

Considering independent Claim **1,** Neale teaches (Title, Abstract, FIG. 2, FIG. 3, FIG. 4, column 1, lines 16-67, column 2, lines 1-67): “A method for identifying a fissile material within an interrogated vessel (“Material **discrimination** arises from the energy dependence of the transmission coefficient being different for different materials”, in title, abstract, column 8, lines 7+), comprising: casting an incident photon beam (**18** in FIG. 4) from an electron beam accelerator (**10** in FIG.4; using a **single broad band** linear accelerator **X-ray source**) through the interrogated vessel on the fissile material (**12** in FIG. 3); detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material with an array of energy sensitive detectors , a first set of scintillator paddles, and a second set of scintillator paddles (**22** in FIG. 4; detected by **pairs of crystals** placed **one behind the other** the **front crystal** being sensitive to **lower energy** X-rays while the **rear crystal** is sensitive to **higher energy** X-rays; column 8, lines 9+), herein the array of energy sensitive detectors are sensitive to different ranges of photon beam energy **(**as shown in Figs. 2, 3; column of detector elements 44 each of which is adapted to respond separately to **low energy** (photons as show in Fig. 6, 7) and high energy (photons as show in Fig. 6, 7) (typically 1 MeV and 5 MeV respectively) transmitted by the container 32, to produce two separate outputs one corresponding to the quantity of X-rays of the lower energy and the other the quantity of X-rays of the higher energy received by the detector (column 12, lines 44+)**)** are arranged **sequentially** (detected by **pairs of crystals** placed **one behind the other** the **front crystal** being sensitive to **lower energy** X-rays while the **rear crystal** is sensitive to **higher energy** X-rays) in a direct path of the emerging

photon beam such that each receives the emerging photon beam, and are sensitive to different ranges of photon beam energy; obtaining signals from detectors sensitive to different ranges of X-rays energy, a second signal from the first set of scintillator paddles, and a third signal from the second set of scintillator paddles each signal indicative of photon yield within the different ranges of photon beam energy (as shown in Fig. 3; column 3, lines 44+; to produce two separate outputs one corresponding to the quantity of X-rays of the lower energy and the other the quantity of X-rays of the higher energy received by the detector" (column 12, lines 44+)); and determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield (photon attenuation) in at least one of the three (several) signals (column 3, lines 44+), the determined photon energy regime identifying the fissile material (detection and procession systems in Fig. 12, 13; column 3, lines 44+). (Material **discrimination** arises from the energy dependence of the transmission coefficient being different for different materials. The transmitted X-rays are detected by **pairs of crystals** placed **one behind the other** the **front crystal** being sensitive to **lower energy** X-rays while the **rear crystal** is sensitive to **higher energy** X-rays. Good discrimination is possible at low X-ray energies because of the strong variation with energy of the transmission coefficient for the crystals of the X-ray detectors. The X-rays are absorbed by the photoelectric process which has a strong energy dependence; (column 8, lines 7+). The X-ray detectors may be crystals of zinc tungstate or cadmium tungstate in which event the X-ray photons are converted by the crystals into electromagnetic radiation in the visible range and the photons of visible light can be detected and quantified using a

photo-electric sensor adapted to generate from the light emitted from the crystal an electric current which can be measured to give a numerical value proportional to the X-ray photon population incident on the appropriate crystal. As well known in the art of high energy photon detection (see for example Groom Fig. 24.1) the photon attenuation length for photons with energy up to 50 MeV is below 100 g/cm^2 and it is less than for photons with energy 5 MeV in a high atomic number Z material. Therefore design (thickness) of **rarer crystal** detector is enough for absorption and detection of photons with energy **up to 50 MeV**). Neale's detectors is capable to detect photon beam within an energy range from about 1 MeV to about 50 MeV, which meets claim limitation.

Neale does not necessarily teach the limitation that a first detector is "an array of fission-fragment detectors and the array of fission-fragment detectors is sensitive to different ranges of photon beam energy " and "obtaining a first signal from the array of fission-fragment detectors".

However, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include said limitation in view of Gunther drawn to detection of photons with determined range of energy in the field of photofission fragment detection, hence analogous art, who teach to "applicability of a parallel plate avalanche detector to photofission detection (PPAD fission fragment detector) which can be used for high sensitive and selective detection of photons in photofission energy range and is insensitive to gamma background of photons with other energies (p. 462, column1, lines 8-29). Motivation for said inclusion derives from Gunther and Groom: because "Cross section of heavy nucleus photofission is large for photons with the

energy of photofission range above ~5 MeV, (see cross section of photofission σ_{nucl} in Fig. 24.3,) and this is useful for increase an efficiency of said photons detection and fission fragment detectors are insensitive to gamma background of photons with energies out of photofission range".

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an existing and well tested detector as disclosed by Gunther in the teaching by Neale to use photofission fragment detector as one of the energy sellective detector for sellective registration of the photons in photofission energy range and this using can improve material discrimination.

There is a common knowledge a dependence on a material atomic number Z of the X-ray energy spectrum transformation after transmission X-ray through material with the different atomic numbers Z (disclosed by Groom, Fig. 24.1, 24.2, 24.3, 24.4, 24.5).

There is a common knowledge that said spectrum transformation can be determined by X-ray energy spectrum registration with attenuating material and without attenuation material by known energy resolving X-ray detectors and photon detection in several energy ranges is enough for material Z identification (as disclosed by Neale). Some version of detectors sensitive for different ranges of X-ray energy spectrum is disclosed by Neale. It is obvious for ordinary skill in the art of radiation detection to use available energy selective fission –fragment detectors for detecting of photons in corresponded range of X-ray energy spectrum as disclosed by Gunther.

Motivation for said inclusion derives from Nealei who teaches: “Material discrimination arises from the energy dependence of the transmission coefficient being different for different materials” (column 8, lines 7+).

The claim would have been obvious because a person of ordinary skill has good reason to pursue the known options within his her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense (see MPEP 4123). The alleged distinction between the claimed “method for identifying fission material” of the invention and cited prior art does not correspond to any non-obvious claimed limitation. Applicant’s method use the same steps as in prior arts. Apparatus disclosed by prior Arts combination is capable to perform the Applicant’s method.

On claim **2**, Neal teaches: said identifying comprises determining a range atomic number of the material in a container (**Material discrimination** arises from the energy dependence of the transmission coefficient being different for different materials (abstract, column 8, lines 13-44), and determining the **mean number** Na of X-rays transmitted through a region thereof (in title, abstract, column 1, lines 18-67)).

On claim **3**, Gunther teaches: detecting the emerging photon beam from the material with the array of fission-fragment detectors comprises detecting an energy range of the emerging photon beam in a range between about 10 MeV to 20 MeV ” is disclosed by (p. 462, column1, lines 11-29).

Motivation for said inclusion derives from Gunther and Groom: because “Cross section of heavy nucleus photofission is large for photons with the energy of photofission range above ~5 MeV, (see photofission cross sections σ_{nucl} in Fig. 24.3) and this is useful for increase an efficiency and a selectivity of said photons detection and because the fission fragment detectors are insensitive to gamma background of photons with energies out of photofission range”.

On claim **6**, Neale teaches: detecting the emerging photon beam from the material with the first set of scintillator paddles comprises detecting an energy range of the emerging photon beam in a range up to about 6 MeV; “The transmitted X-rays are detected by **pairs of crystals** placed one behind the other the **front crystal** being sensitive to lower energy X-rays while the **rear crystal** is sensitive to higher energy X-rays, lower energy X-rays being filtered out using appropriate screens. Good discrimination is possible at low X-ray energies because of the strong variation with energy of the transmission coefficient for the crystals of the X-ray detectors. The X-rays are absorbed by the photoelectric process which has a strong energy dependence” (Abstract, in FIG. 2, in FIG. 3, column 8, lines 13-44)).

On claim **7,** Neale teaches: detecting the emerging photon beam from the material with the second set of scintillator paddles comprises detecting an energy range of the emerging photon beam exceeding about 6 MeV; “The transmitted X-rays are detected by **pairs of crystals** placed one behind the other the **front crystal** being

sensitive to lower energy X-rays while the **rear crystal** is sensitive to higher energy X-rays, lower energy X-rays being filtered out using appropriate screens. Good discrimination is possible at low X-ray energies because of the strong variation with energy of the transmission coefficient for the crystals of the X-ray detectors. The X-rays are absorbed by the photoelectric process which has a strong energy dependence"; (column 8, lines 13-44)).

On claim **9**, Neale teaches: creating a photon distribution energy curve using a combination of the first signal from the array of energy selecting detector, the second signal from the first set of scintillator paddles, and the third signal from the second set of scintillator paddles; (in abstract, in FIG. 2, FIG. 3, Fig. 12, Fig. 13, "The transmitted X-rays are detected by **pairs of crystals** placed one behind the other the **front crystal** being sensitive to lower energy X-rays while the **rear crystal** is sensitive to higher energy X-rays, lower energy X-rays being filtered out using appropriate screens. Good discrimination is possible at low X-ray energies because of the strong variation with energy of the transmission coefficient for the crystals of the X-ray detectors. The X-rays are absorbed by the photoelectric process which has a strong energy dependence; (column 8, lines 13-44)). FIG. 13 is a block schematic diagram of the signal processing stages of items 100 and 102 in FIG. 12 and the data processing and computation stage 104 of FIG. 12. Those elements making up each of the items of FIG. 12 are contained in outline boxes appropriately labeled with the corresponding reference numeral from FIG. 12 for ease of reference). Gunther teaches using the

fission-fragment detector as energy selecting detector and use signal from this detector for detection og photin flux attenuation in said energy range (as delailed in rejection to claim 1).

On claim **28**, Neale teaches: casting an incident photon beam from the electron beam accelerator comprises directing an electron beam onto a radiator for producing a photon; “detector arrays being disposed respectively opposite **the accelerators;** Typically the source is a conventional 10 MeV electron linear accelerator with targets and beam hardeners to determine the X-ray spectrum emanating therefrom.”, in abstract, Figs. 4, 5, 6,

On claim **29**, Neale and Groom teach: producing electron pairs with a converter coupled to the second set of scintillator paddles; “Each of the detectors is made up of a target typically of tungsten (although any other dense high z material may be used) with two zinc tungstate crystals located on opposite sides thereof and positioned so as to receive photons of energy produced on the one hand predominately by electron-positron pair production (Neale: column 12, lines 61+). A probability of electron-positron pair conversion is high for photons with energy exceeding about 6 MeV (as shown in Fig. 24.2 of Groom)”.

On claim **30**, Neale teaches: detecting an energy range of the electron pairs exceeding about 6 MeV (column 2, lines 53+); “Each of the detectors is made up of a

target typically of tungsten (although any other dense high z material may be used) with two zinc tungstate crystals located on opposite sides thereof and positioned so as to receive photons of energy produced on the one hand predominately by **electron-positron pair** production; a lead plate will absorb the lower energy photons and transmit only the higher energy photons thereby ensuring that the second zinc tungstate detector only tends to receive energy attributable to electron-positron pair production and virtually none resulting from Compton scatter" (Neale: column n12, lines 61+). "A probability of electron-positron pair conversion is high for photons with energy exceeding about 6 MeV" (as shown in Fig. 24.2 of Groom).

On claim **31**, Neale teaches:" the array of energy resolving detectors including scintillating detectors: the first set of scintillator paddles is sensitive to a range of photon beam energy up to about 6 MeV, and the second set of scintillator paddles is sensitive to a range of photon beam energy above about 6 MeV; (as shown in Fig. 3;column 10, lines 18+).

Neale does not necessary teach the limitation: the array of fission fragment detectors is sensitive to a range of photon beam energy between about 10 MeV and 20 MeV".

However, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include said limitation in view of Gunther drawn to detection of photons with determined range of energy in the field of photofission fragment detection, hence analogous art, who teach to "applicability of a parallel plate avalanche detector to photofission detection (PPAD fission fragment detector) which

can be used for high sensitive and selective detection of photons in photofission energy range and is insensitive to gamma background of photons with other energies (p. 462, column1, lines 8-29). Motivation for said inclusion derives from Gunther and Groom: because “Cross section of heavy nucleus photofission is large for photons with the energy of photofission range between about 10 MeV and 20 MeV,, (see cross section of photofission σ_{nucl} in Fig. 24.3,) and this is useful for increase an efficiency of said photons detection and fission fragment detectors are insensitive to gamma background of photons with energies out of photofission range”.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the teaching by Gunther in the teaching by Neale to use photofission fragment detector for sellective registration of the photons in photofission energy range and this using can improve material discrimination.

It is obvious for ordinary skill in the art of radiation detection to use an available fission – fragment detector for detecting if photons in corresponded range of X-ray energy spectrum as disclosed by Gunter.

Motivation for said inclusion derives from Nealei who teaches: “Material discrimination arises from the energy dependence of the transmission coefficient being different for different materials”, column 8, lines 7+).

The claim would have been obvious because a person of ordinary skill has good reason to pursue the known options within his her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. The alleged distinction between the claimed “method for identifying

fission material" of the invention and cited prior art does not correspond to any non-obvious claimed limitation.

On claim **32**, Neale teaches: the first and second set of scintillator paddles comprise any scintillators transforming a high energy photon energy into low energy photons detectable by photosensors, including plastic scintillator paddles (column n11, lines 46+).

On claim **33**, Neale and Gunter teach (as detailed in rejection of claim 31): the array of fission fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles are sensitive to different, but overlapping ranges of photon beam energy.

Motivation for said inclusion derives from Nealei who teaches: "Material discrimination arises from the energy dependence of the transmission coefficient being different for different materials", column 8, lines 7+).

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vadim Dudnikov whose telephone number is 571- 270-1325. The examiner can normally be reached on 8:00 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Jack W. Keith can be reached, Mon-Fri 7:00am-4:00 pm, at telephone number 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

VD
April 3, 2007.

/Johannes P Mondt/
Primary Examiner, Art Unit 3663